

Generalization of Mands in Children with Autism from Adults to Peers

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To assess the degree to which a mand repertoire that was taught to children with autism would generalize from adults to peers, three preschool-aged children diagnosed with Autism were first taught to mand with adult instructors, and then were tested for generalization across three subsequent phases that involved parents, siblings, and peers. Limited generalization of the mand occurred in the parent phase of the study; manding transferred from instructors to parents without direct teaching for all three participants. However, for none of the subjects did manding transfer to interactions with siblings or peers without direct teaching. The results of the study implicate the need to teach children with Autism to mand from a variety of people, especially peers. Keywords: autism, mands, and generalization.

Children with autism are characterized by deficits in communication and social skills. Teaching children with autism to mand with adults is a common practice in behavioral interventions and is listed as a necessary skill to be taught in many curricular sequences (Leaf & McEachin, 1999; Lovaas, 1981; 2003; Maurice, 1996; Maurice, Green, & Foxx, 2001; Sundberg & Partington, 1998). Most of these curricular sequences also list manding with peers as a target skill in the area of socialization (Leaf & McEachin, 1999; Maurice, 1996; Maurice, Green, & Foxx, 2001; & Sundberg & Partington, 1998). The designation of these curricular sequences to include manding with adults and manding with peers as separate targets leads one to assume that this skill does not generalize across people, but must instead be specifically taught in each domain.

In contrast, when analyzing the social behavior of typically developing preschool children, Tremblay, Strain, Hendrickson, and Shores (1981) found that, on average, they exhibited one initiation toward a peer every two minutes in an unstructured setting. A later study obtained similar results, showing that non-disabled children initiated with each other an average of five times in a 10 - minute session (McGrath, Bosch, Sullivan & Fuqua, 2003). Research investigating the social behavior of children with autism and developmental delays repeatedly indicates impairments in socialization, including initiations toward peers (Guralnick & Weinhouse, 1984; Pierce-Jordan & Lifter, 2005; Stone & Lemanek, 1990).

Many studies have been successful in teaching children with autism to initiate toward their peers using a variety of strategies including the use of a tactile prompt (Shabani et al. 2002; Taylor & Levin, 1998;), script fading (Krantz & McClannahan, 1993), visual supports (Johnston, Nelson, Evans, & Palazolo, 2003), and peer tutors (Goldstein, Kaczmarek, Pennington, & Shafer, 1992; & Pierce & Schreibman, 1995). Hancock and Kaiser (1996) specifically taught children to mand with their siblings during play and snack times. Similarly, Taylor, Hoch, Potter, Rodriguez, Spinnato, & Kalaigian, (2005) taught children to mand for preferred items with their peers during snack time. The participants in the Taylor et al. study all were reportedly able to mand for preferred items with adults, but did not mand with peers until specifically taught to do so.

Skinner (1957) described the different verbal operants as functionally independent. Establishing one verbal operant does not automatically result in the appearance of another. A word with the same topography may serve several different functions, such as a discriminative function or a reinforcing function. For example, the word or object "drink" may function as a discriminative stimulus which evokes a listener's echoic or tact response, but it may also function by producing a reinforcer when an establishing operation is in effect. Lamarre and Holland (1985) were the first to demonstrate empirically

the functional independence of the different but related classes of verbal operants, specifically mands and tacts that were topographically the same. Since then many studies have supported their research by demonstrating that the acquisition of one verbal operant does not necessarily transfer to another class of operant. Namely, the acquisition of a mand repertoire did not generalize to the acquisition of a tact repertoire without direct teaching (Sigafoos, Doss, & Reichle, 1989; Twyman, 1995; Twyman, 1996; Nuzzolo-Gomez & Greer, 2004; & Nirgudkar, 2005).

Given the empirically validated fact that a mand repertoire may not generalize to other verbal operants, it is speculated that the acquisition of a mand repertoire may also fail to generalize across settings and/or people, especially in children with autism who are known to have difficulties with the generalization of skills (Wynn & Smith, 2003; Williams, Carnerero, & Perez-Gonzalez, 2006). However, we found no empirical evidence reported in the literature that would support this assumption.

The purpose of the study reported here was to assess whether a mand repertoire taught to preschool aged children with autism would transfer from adults to peers. Since children with autism demonstrate impairments in initiations toward peers, and peer mands are considered initiations, it is valuable to assess this particular transfer of skills. Failure to demonstrate the transfer of a mand repertoire across people would indicate the need to involve peers as well as adults when teaching. The current study assessed the generalization of mands across four conditions using adult instructors, parents, siblings, and peers.

Method

Participants

Three preschool aged children, two boys and one girl, diagnosed with autism participated in this study. The children are identified (via pseudonyms) as Rachel, age 4, Bobby, age 5, and Nate, age 4. Prior to inclusion in the study, all were independently diagnosed with autism by licensed psychologists. All three children had some vocal ability, i.e., echoic and tacting skills, but had limited functional communication skills. The participants had some receptive language skills, i.e., they could identify several objects, colors, and shapes by pointing and could follow 1-step instructions. They also had emerging imitation skills including imitation with objects and gross motor imitation. Prior to the study, most attempts at communication were in the form of gestures (e.g., pointing to desired objects), leading the communication partner to the desired object (e.g., leading mother by the hand to the refrigerator), or bringing an object to a communication partner (e.g., bringing an empty cup to mother when thirsty). They did not mand for desired objects vocally or via other functional communication modalities such as sign or pictures. The children were receiving intensive behavioral intervention in their homes in addition to participating in a small group setting for at least two afternoons each week.

The parents of the children, all of whom were intellectually normal, participated in the second phase of the study, and children were selected who had siblings who could participate in the third phase of the study. All of the siblings who participated in the study were non-handicapped. Rachel's fraternal twin sister, Bobby's eight year old brother, and Nate's six year old brother participated in the sibling phase of the study. The peers included in the fourth phase of the study were preschool - aged children, also diagnosed with autism. The peers had advanced mand repertoires, including full sentence mands using a variety of sentence frames, mands for missing items, and mands for information. The peers also had superior language skills including advanced receptive skills, independent play skills, and intraverbal skills.

Materials and Setting

Preferred items for the participants, including snacks and toys, were identified prior to the beginning of each session by offering a variety of items and noting those selected. The items selected were then kept in plain view but beyond the participant's reach during baseline and training conditions. Sessions were conducted with the trainer and participant seated face-to-face, at a child-sized table or on the floor. Phases 1 through 3 took place at the child's home in various rooms throughout the house. Phase 4 took place in the child's small-group instructional setting. The small group setting was comprised of the participant and up to five other children also diagnosed with autism.

Data Collection and Response Definition

Data were collected using a frequency measure of unprompted and prompted mands during 20-minute training sessions. Baseline data were calculated by recording the number of unprompted mands as well as the number of opportunities to mand per 20-minute baseline session. The percentages of unprompted mands were then recorded for each session. Unprompted mands were scored when the participant looked at the designated trainer and vocally requested the item using at least the name of the item, e.g., "chip" or "I want chip." Mands addressed to anyone other than the designated trainer, or taking the form of pointing and/or reaching toward the preferred item, were not considered unprompted mands. Opportunities to mand were defined as situations in which highly preferred items were placed in view but out of the child's reach and both the child and designated instructor were present. A prompted mand was defined as any occurrence in which the instructor provided an echoic prompt to evoke a mand response from the participant. The prompt consisted of the full echoic prompt, e.g., "bubbles" or a partial echoic prompt, e.g., "buh". The least intrusive but most effective prompt that would consistently evoke the response was used.

Interobserver Agreement

Interobserver agreement data were collected, in vivo, by trained observers. Interobserver agreement was scored for 23% of sessions, across all phases, by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Mean agreement was 93%, with a range of 85% to 100%. Differences in agreement occurred due to discrepancies between raters' definitions of prompted and unprompted mands. Additional training of response definitions was then given to the trainers to ensure that accurate and reliable data were being recorded.

Procedure

Phase 1: Mands with adult instructor. Following a preference assessment using a paired-choice procedure, in which items were presented in pairs and the items selected were noted, preferred items were placed in the child's view but out of reach. Baseline data were recorded for three sessions. During the baseline condition, the instructor contrived opportunities to promote mands using incidental teaching procedures (Hart and Risley (1982), but did not prompt any requests. All unprompted mands according to the response definition (i.e., the child requested the item using at least the name of the item) that occurred during the baseline condition were reinforced by giving the child the identified item. Once baseline was established, the teaching condition was implemented in which the instructor continued to promote mands using incidental teaching procedures and vocally prompted mands using an echoic procedure. Access to the preferred items was only granted following a mand for the item. For example, if the child reached for bubbles the instructor would block access to the bubbles and prompt the mand by saying "Say bubbles." Access to the bubbles was granted after the echoic response. If the child did not repeat the mand after a prompt, the prompt was repeated up to two more times. If the child did not mand following the two additional prompts, the item was removed from view and presented again in a later preference assessment. Paired-choice preference assessments were accomplished at the start of each

session and at least once during the session to ensure that the items being presented were highly preferred. All mands were reinforced with access to the preferred items. Differential reinforcement of unprompted mands was accomplished by providing longer access to toys or larger pieces of edibles following unprompted mands. Following a prompted mand the child was given a small piece of the edible (e.g., one fourth of a chip) or brief access to the toy (e.g., 10 seconds of bubble play). Following an unprompted mand the child was given a larger piece of the edible (e.g., the whole chip) or longer access to the toy (e.g., 30 seconds of bubble play). Both baseline and teaching sessions were 20 minutes in length, and teaching sessions continued until at least 75% of the mands were unprompted for two consecutive sessions.

Phase 2: Mands with parent. Once the above mastery criterion for phase 1 was met, baseline data were recorded for three sessions using a parent as trainer to assess the transfer of mands from instructor to parent. Parents were trained to record data and implement the protocol through role-playing and direct coaching by trained instructors. The protocol for mands in baseline of phase 2 was identical to that of phase 1. If the baseline data demonstrated that the child's mand repertoire did not transfer to interactions with the parent (i.e., fewer than 75% of the mands were unprompted), the teaching condition was implemented. The parent vocally prompted mands during contrived opportunities using an echoic procedure identical to that of phase 1 until at least 75% of the mands were unprompted for two consecutive sessions.

Phase 3: Mands with sibling. Baseline data were again recorded for three sessions, this time using a sibling as trainer, to assess the transfer of mands. Following baseline, the teaching condition was implemented. Prior to the teaching sessions, the siblings were taught through the use of role-playing, to vocally prompt the participant's response using the echoic procedure, and to reinforce all mands with access to the preferred item. A trained instructor was also present to coach the sibling through the process, to contrive opportunities for mands by setting up the environment, and to record data. The instructor was present in the room but not a direct component of the teaching dyad (i.e., off to the side). This teaching condition with the sibling continued until at least 75% of the mands were unprompted for two consecutive sessions.

Phase 4: Mands with peer. The fourth phase of the study was implemented using a peer dyad within a small group setting. As in the previous phases, baseline data were recorded for three sessions to assess the transfer of mands to a peer. The teaching condition was then implemented. A slight change was made in this phase regarding who prompted the child to mand. In the previous phases, the mand was prompted by the person who would then reinforce its occurrence. However, in this phase because the peer had autism and was unable to successfully provide a direct echoic prompt, an adult instructor prompted the child to mand in a way that would be reinforced by the peer by positioning herself behind the child and providing the echoic prompt. The peer was taught to reinforce all mands by providing access to the preferred item. Access to any of the preferred items was only granted following a mand directed to the peer. This teaching condition continued until at least 75% of the mands directed to the peer were unprompted, as in the other phases.

Results

In Phase 1 the baseline levels of unprompted mands with the instructors were well below mastery criterion for all three participants (Figures 1, 2, & 3). Rachel's percentages of unprompted mands were near zero during the initial baseline measurement (Figure 3); however, Bobby's and Nate's percentages of unprompted mands during the initial baseline were somewhat higher (Figures 2 & 3).

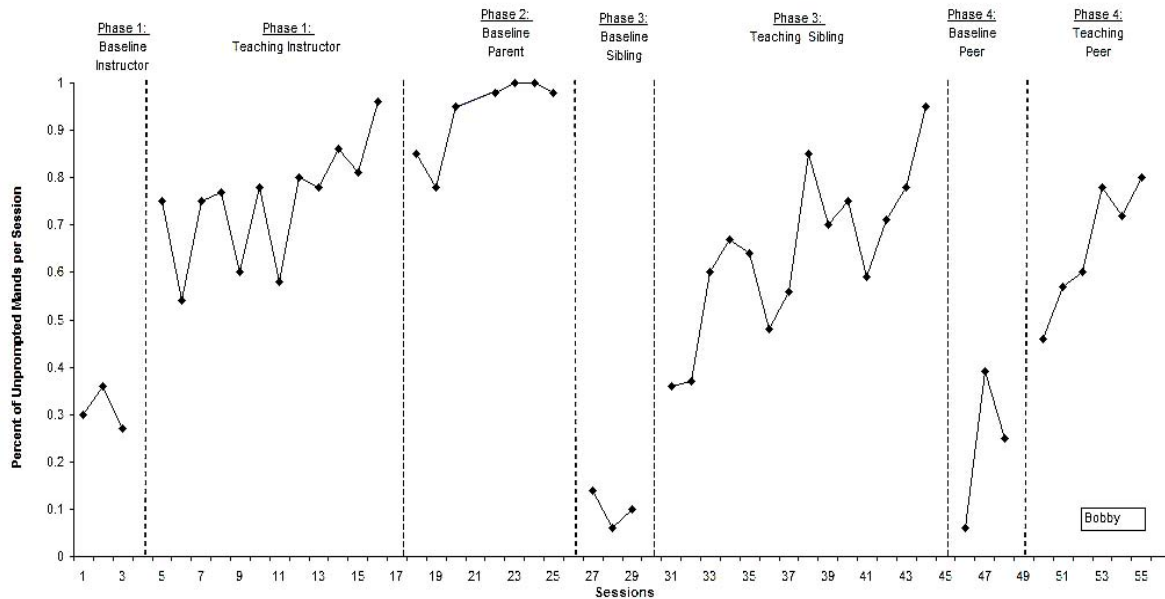


Figure 1: Percent of unprompted mands per 20-minute session for Bobby across all phases.

Nate, who had the highest percentage of unprompted mands during the initial baseline measurement, met mastery criterion with the instructor within four sessions (Figure 2). Bobby met mastery criterion with the instructor within nine sessions (Figure 1) and Rachel consistently demonstrated the skill with the instructor after 19 sessions (Figure 3). For all three participants, this skill generalized from their instructors to their parents without direct teaching (Figures 1, 2, & 3).

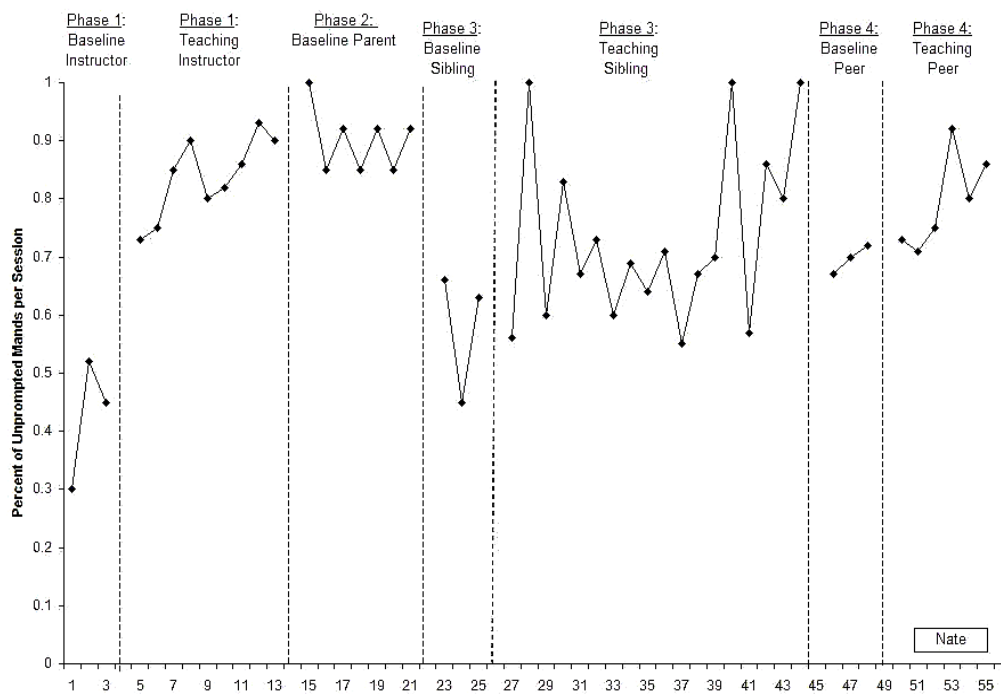


Figure 2: Percent of unprompted mands per 20-minute session for Nate across all phases.

For Rachel, this skill transferred to her parent with 100% of her mands being unprompted; she did not reach such a high level of unprompted mands during any of the other phases (Figure 3). On the other hand, none of the participants' mand repertoires generalized from parents to siblings; all required direct teaching with a sibling to reach the mastery criterion (Figures 1, 2, & 3). Rachel's and Bobby's baseline levels of unprompted mands returned to zero or near zero when assessed with their siblings (Figures 2 & 3). However Rachel acquired the skill with her sibling after only five sessions of teaching (Figure 3).

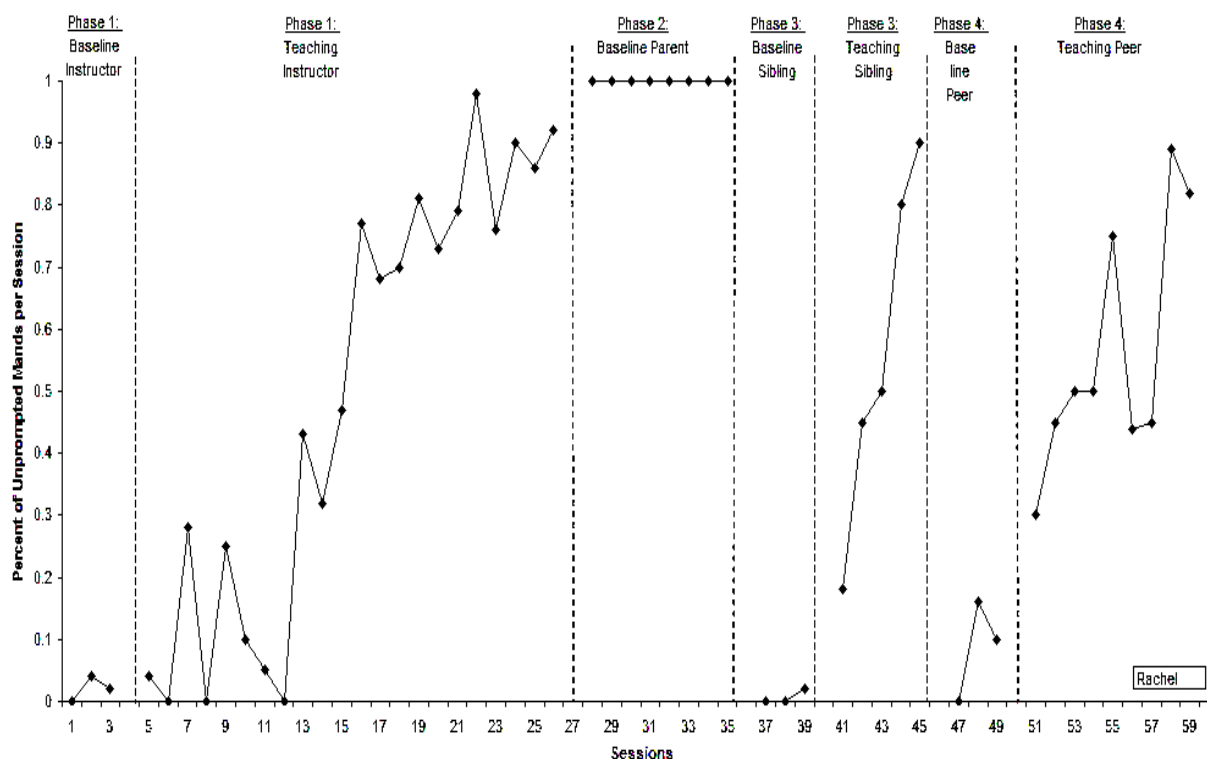


Figure 3: Percent of unprompted mands per 20-minute sessions for Rachel across all phases.

Nate's percentages of unprompted mands with his sibling were higher during baseline, but he required 17 sessions of teaching to reach mastery in this phase (Figure 2). Subsequently, and similarly, for all three participants the skill also failed to transfer to interactions with peers (Figures 1, 2, & 3). Nate's baseline percentage of unprompted mands with a peer was again higher than that of the other participants, but all three children required teaching before the skill was consistently demonstrated with a peer.

Discussion

The results of the study indicate that a mand repertoire established with an instructor does not necessarily generalize to other people -- specifically to siblings and peers. However, limited generalization of the mand was demonstrated in the parent phase of the study. Baseline data were recorded for several additional sessions in the parent phase to ensure that the mand repertoire had indeed transferred. There are several possible explanations for the generalization of mands to parents, but not to siblings or peers. First, both the instructors and the parents were adults, which may have resulted in generalizing between adult-related characteristics and thus transferred the skill more easily than to a child. Second, the participants had a history of receiving preferred items from their parents. The addition of a mand repertoire with parents may have simply produced a more efficient way of receiving those items.

Third, the siblings and peers used in the study required occasional prompting to deliver the items when mands occurred, causing a delay in reinforcement of the mand.

It was initially decided to use a sibling in addition to a peer, on the hypothesis that the mand repertoire would be more likely to generalize to a very familiar child. However, since the skill did not transfer to the siblings, the results indicated that this hypothesis was incorrect. During the sibling and peer phases of the study, the participants would often direct a mand for the preferred item to the adult in the room rather than to the child, despite the fact that the item was in the child's possession. This again demonstrates that the skill did not easily transfer from adult to child.

There are several limitations of this study. For one, the author's acknowledge that the design implemented was not a true multiple baseline design. Instead, baseline data for each successive phase of the study were recorded following mastery of the previous phase. Although anecdotal reports indicate that prior to the study the participants did not reliably mand in interactions with parents, siblings, or peers, it would have been very desirable to formally assess, prior to any teaching, whether initiations toward parents would have occurred. However, the results of the study strongly indicate that initiations toward siblings and peers would not have occurred prior to the introduction of the teaching component.

Another limitation of the study is that the mands emitted by the participants were likely to be under multiple control. Since the items manded for were in sight, the mands were not pure mands, but multiply controlled: part mands – part tacts. To ensure the vocal response was at least part mand, not just tact, the item was always delivered following the vocal response and the participants were allowed limited access to the preferred items used during sessions to ensure that an establishing operation was present.

Despite its limitations, the results of the study implicate the need to teach children with autism to mand with a variety of people, not just with instructors or teachers. The mand is an essential verbal operant necessary for communication and socialization. The introduction of a mand repertoire with peers is a needed pre-requisite for many more complex social skills and should be included into the curricula used to teach children with autism.

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Author Notes

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